

**In Our**

# Nature



The State of the Environment  
in North Carolina

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## The State of the Environment in North Carolina

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# In Our Nature

## An Introduction...

It has been my great honor and privilege to serve as the department's secretary for nearly eight years. It is sometimes pointed out that I have held the position longer than any of my predecessors. This accomplishment should not be attributed to my skills, but rather to the intelligent, hard-working and capable men and women that make up the department. They are the ones who work daily towards conserving and protecting our natural resources and ensuring a high-quality environment for all North Carolinians. Credit goes not only to those out in the field, but also to the many employees working behind-the-scenes in administrative offices within the department who keep things running and make all of our accomplishments possible. Credit also goes to our many partners.

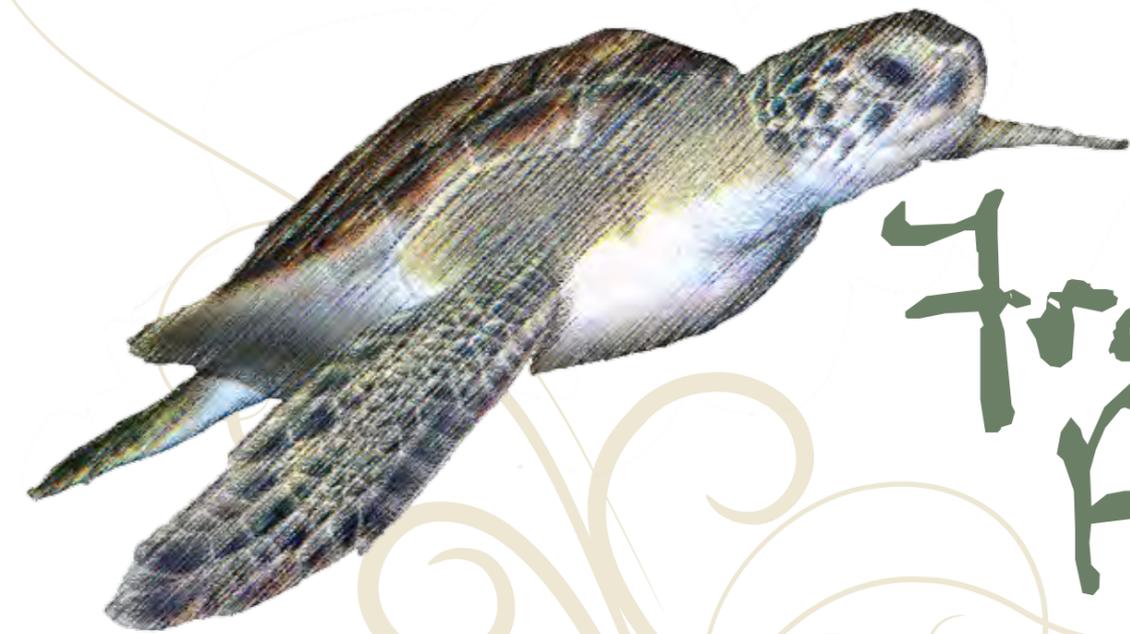
In Our Nature is not your typical state of the environment report. While facts and figures are important in getting a clear picture of the health of North Carolina's natural resources, I feel that facts and figures alone cannot express the wide breadth of talent, unique expertise and true grit demonstrated by the department over the past eight years. For those of you interested in a more in-depth look at the current state of the environment in North Carolina and the challenges we plan on tackling as we forge ahead, please refer to the Appendix on page 134.

In the pages between this introduction and the above-mentioned appendix, you will not find simply facts and figures – you will find stories. These are the stories of where this department has journeyed over the past eight years. They are stories of accomplishments made possible through tenacity and collaboration. They are glimpses into the lives of people who care deeply about their jobs and their commitment to North Carolina's beauty and her people.

Read on, and you will meet the department's risk-takers who fight forest fires and handle threats of nuclear hazards. Follow along as department educators lead North Carolina's classroom teachers across mountains, along coastlines and even under the sea in cutting edge professional development programs. Learn about how One North Carolina Naturally has helped guide the conservation of a natural network of working lands and natural areas, and how natural treasures like Grandfather Mountain and Chimney Rock will be preserved and showcased for future generations. Discover how many of our state's natural resource protection endeavors also benefit public health, the military and North Carolina's economy.

Over the past eight years, the people of North Carolina's Department of Environment and Natural Resources and our many partners have achieved great successes. The road ahead, however, is not without substantial challenges. Global climate change, clean and abundant drinking water and alternative energy resources are issues we must quickly and creatively address in the coming years, all while helping everyone realize the connections between our everyday choices and actions and the health of our shared environment and future. I am confident that the men and women of the department and our partners are up to these challenges. After you read this report, I think you will share that same confidence. Coming together to solve problems and develop new solutions and initiatives to improve North Carolina's environment is what we do...it's in our nature.

Sincerely,  
William G. Ross Jr.



# From A to Z

The N.C. Department of Environment and Natural Resources has it all - from A to Z - where A is for aquariums and Z is for zoo! North Carolina's three coastal aquariums, as well as the N.C. Zoological Park in Asheboro, are all accredited by the Association of Zoos & Aquariums, or AZA. What does this accreditation mean? In order to be accredited, zoos and aquariums must achieve rigorous standards for animal care, education, wildlife conservation and science. Facilities are evaluated on animal environments and nutrition, enrichment opportunities, veterinary programs, conservation and research efforts, education programs and safety. The AZA accreditation is difficult to attain and speaks to the high standards for which North Carolina's zoo and aquariums strive for and achieve.

## A is for Aquarium

Three Marine Resources Centers were opened in 1976 along North Carolina's coast. It was in 1986 that these facilities were renamed the North Carolina Aquariums. The past eight years have been eventful for all three institutions.

*The N.C. Aquariums aren't just for fish! A green sea turtle at the Aquarium on Roanoke Island (C.P. "Buster" Nunemaker III) above; moon jelly (on next page) at the Aquarium at Fort Fisher. All photos courtesy of N.C. Aquariums.*

### N.C. Aquarium on Roanoke Island

By 2001, the recently renovated aquarium in Manteo had been open for several months. The new facility was twice its previous size and ready to serve visitors with new programs, its signature Graveyard of the Atlantic exhibit and new ways to educate and excite. A new Aquarium Confidential exhibit opened in 2006, giving guests a behind-the-scenes look at aquarium animal care. The Roanoke Island facility continues to plan for even more new projects including an onsite oyster research facility and an open ocean exhibit.



### N.C. Aquarium at Fort Fisher

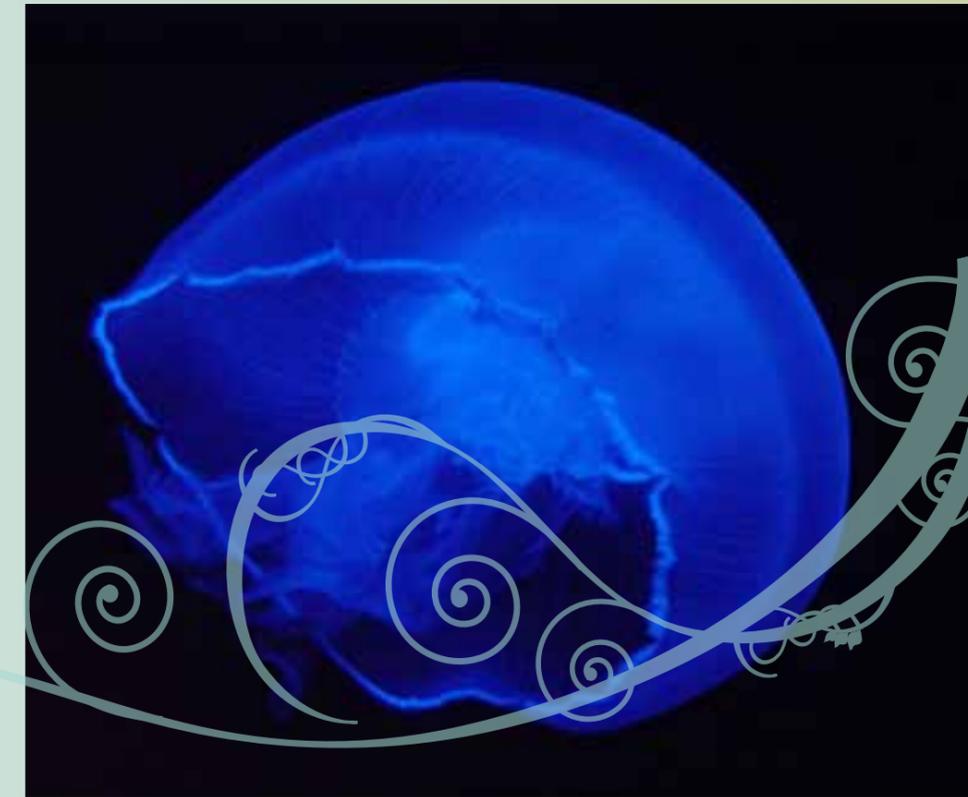
In March 2002, this N.C. Aquarium, located on Kure Beach, reopened its doors following a \$17.5 million renovation. It is triple the size of the previous facility and includes the stunning, half-acre large Cape Fear Conservatory. The following year three more exhibits were opened - Buzzard Bay, Seahorses and Loggerhead Legacy. New developments continued in 2005 with the unveiling of an Exotic Aquatics exhibit.



*The ray touch pool at the N.C. Aquarium at Pine Knoll Shores. Photo by Scott Taylor.*

### N.C. Aquarium at Pine Knoll Shores

After being closed to the public for 2.5 years, in 2006 visitors to Bogue Banks were welcomed to the reopened N.C. Aquarium at Pine Knoll Shores. The new facility is 93,000 square feet in size, three times larger than the previous facility. Exhibits are based around a Mountains to the Sea theme, complete with a mountain waterfall. Other favorites of the new building include the sea otter exhibit and the 306,000-gallon Living Shipwreck exhibit.



# Z is for Zoo



The N.C. Zoological Park was the first American zoo designed from the very beginning around the “natural habitat” philosophy, in which exhibits mimic as closely as possible the animals’ native environment. It was 1973 when the first animals arrived – two Galapagos tortoises. From that time on the zoo was continually planning, expanding and improving, and the past several years have been no exception.

In 2001 the zoo opened a redesigned entrance to its Africa section. Known as the *Akiba Market*, the ranger offices, gift shops and restaurant facilities recreate a Ugandan village. Also in 2001, the zoo’s chimpanzee exhibit reopened after more than two years under renovation. The *Kitera Forest* (“kitera” is the Ugandan word for chimpanzee) features a lush environment with a 25-foot high artificial climbing tree for its inhabitants.

Although known for animals from across the world, the N.C. Zoo does its part to help protect native wildlife as well. In 2001, the zoo and the North Carolina Zoo Society opened the Valerie H. Schindler Wildlife Rehabilitation Center. The purpose of the center is to care for injured and orphaned native animals until they can be returned to their natural habitat.

Another major expansion of the zoo took place in 2008 when the *Watani Grasslands Reserve* was completed. This area now houses the zoo’s elephants and rhinoceroses. The \$8.5 million expansion allows the elephants seven acres on which to roam, and the zoo’s Southern white rhinos enjoy 40 acres of African Plains habitat.



*The zoo’s elephants and rhinos got major habitat upgrades in 2008. N.C. Zoo photos.*



*A baby squirrel receives care at the N.C. Zoo Rehabilitation Center. N.C. Zoo photo.*



# Taking Stock

The Department of Environment and Natural Resources is the lead stewardship agency for the preservation and protection of North Carolina's natural resources. This is quite a responsibility, and it takes the work of many who are dedicated to inventorying and managing resources and populations.

## School Planning

From 2001 through 2008, the Division of Marine Fisheries has released 11 new or updated fishery management plans. Such a plan must be prepared for all of North Carolina's commercially and recreationally significant species or fisheries. Each plan is a colossal undertaking, incorporating information and research on stock assessments, habitat, pollution and social and environmental impacts. Input is obtained from fisheries, scientists and the public, and the final plan is usually about 250 pages in length.

*In 2004 the N.C. Marine Fisheries Commission adopted an amendment to the state's blue crab management plan. Blue crabs are North Carolina's top commercial fishery. N.C. Division of Marine Fisheries.*



## Gorgeous Gorges

Securing the land for a new state park is just the beginning. In 2001, a comprehensive natural heritage inventory was completed for Gorges State Park, North Carolina's first state park located west of Asheville. The department's Natural Heritage Program worked with researchers from N.C. State University, Western Carolina University and the N.C. Geological Survey to collect information that would enhance the interpretation of the park's impressive features while protecting the rare and sensitive elements in the park.

The geological inventory of Gorges State Park identified an active landslide. Most of us think of a landslide as a single, sudden event, but some landslides move only a few inches each year. The landslide in Gorges State Park could move, depending on rainfall, several inches to a few feet each year. The four-acre landslide presented a great interpretive element for park planners to incorporate, as well as an area on which they would definitely avoid any construction.



*Bearwallow Falls at Gorges State Park. N.C. Division of Parks and Recreation.*

Inventories by researchers identified several rare community types and rare species. "As plans are made for foot trails, roads and a park office," said Linda Pearsall, head of the Natural Heritage Program, "we want to put these in places that won't harm significant resources, but will give park rangers the chance to interpret them to the public."



*Both of these significant species can be found in Cumberland County.*

*Fox squirrel. Terry Shankle, N.C. Wildlife Resources Commission.*

*Bearded grass-pink orchid. Bruce Sorrie, N.C. Natural Heritage Program.*

## County Bounties

Each of the 100 counties in North Carolina has its own natural heritage that the Department of Environment and Natural Resources' N.C. Natural Heritage Program is working to map. Candace Williams, director of the Sandhills Area Land Trust's Cumberland County office, perhaps best explained the importance of the County Natural Heritage Inventory of her county. "This is the story of Cumberland, and it's never been told." The department's Natural Heritage Program conducts these inventories in order to identify the rarest examples of plant and animal diversity in North Carolina and designate Significant Natural Heritage Areas. These inventories inform conservation of our state's natural resources. As of 2008, 82 such inventories have been completed and another seven are underway.

## The Birds and the Bees...And the Fish

Over the past several years, the husbandry staff at the N.C. Aquarium at Fort Fisher have been successful in captive breeding programs for several species. The benefits of captive breeding are many – wild populations and habitat are not disturbed, fish are more likely to be free of parasites and disease, the stress of relocation is avoided and it can be an important tool in conserving threatened and endangered species. Some species for which the aquarium has been successful in establishing captive breeding programs include Atlantic sea nettles, black-banded sunfish, Carolina pygmy sunfish, European cuttlefish, lined seahorses and yellow stingrays.



*The European cuttlefish is one of the species with an established captive breeding program at the N.C. Aquarium at Fort Fisher.*

# The Elements

The idea of the four elements - earth, air, fire and water - goes back to Ancient Greece. While ancient in their derivation, these four elements are evident throughout the functions of the Department of Environment and Natural Resources. Here they provide a framework for sharing major events and accomplishments of the past eight years.

## Earth

### Mapping Landslides

In September 2004, hurricanes Frances and Ivan brought soaking rains to western North Carolina. The heavy rainfall from these storms triggered more than 400 landslides that killed five people, destroyed or heavily damaged 27 homes and blocked countless roads throughout the western part of the state. Many calls for assistance following these events came to the N.C. Geological Survey.

The N.C. General Assembly responded to the crisis with the Hurricane Recovery Act of 2005, which authorized and funded the Geological Survey to begin making landslide hazard maps for 19 of the state's western counties. The Geological Survey creates the maps using Geographic Information Systems (GIS) technology as well as Light Detecting and Ranging (LiDAR) high resolution digital elevation data collected as part of the N.C. Floodplain Mapping Program. While they rely on these modern technologies, the rapid progress they have made would not have been possible without also relying on geologic and soil mapping that had been ongoing for decades beforehand.

The landslide hazard maps show where landslides have happened or are happening, where rapidly moving landslides (called debris flows) are likely to start, the paths that debris flows are likely to take and areas where certain rock types, faults or other structures increase the potential for unstable slopes. Hazard maps have been completed for Macon and Watauga counties and are underway for Buncombe and Jackson.



*Rebecca Latham of the N.C. Geological Survey takes notes about the landslide that occurred in the White Laurel subdivision of Watauga County. Notice that the landslide shown began under the corner of the house, cracking the foundation. N.C. Division of Land Resources.*

### Cleaning Up a Landfill

In order to understand the significance of the Warren County PCB Landfill cleanup, you must go back to 1978. That is when a contractor working for the Raleigh-based Ward Transformer Company illegally sprayed more than 30,000 gallons of PCB-laden waste transformer oil along roadsides in 14 North Carolina counties. PCB stands for polychlorinated biphenyl and was once used in coolants and lubricants for transformers. PCB exposure may cause developmental and reproductive harm to people and is a likely carcinogen. For this reason, the Environmental Protection Agency designated the roadsides where the oil had been sprayed as a Superfund site in 1978. The Superfund program was established by the EPA to address abandoned hazardous waste sites.

It wasn't until 1982 that the contaminated soil was removed from North Carolina's roadsides. In an extremely controversial

decision, the state resolved to bury the polluted soil in a landfill located in the Afton community in Warren County. Warren County residents were vehemently opposed to the landfill's location. The residents' opposition and repeated demonstrations are considered to have elevated the issue of environmental justice to the national level. Eighty-four percent of the Afton community was African-American, and Warren was one of the poorest counties in North Carolina.

The residents of Warren County never gave up on having the landfill site cleaned and the land returned to the community. It wasn't until 2001 that work actually began on removing and cleaning the contaminated soil. In 2003, after more than 20 years, \$17 million and 81,000 tons of soil, the Division of Waste Management had decontaminated the Warren County landfill to a level 10 times cleaner than federal standards required.



*This aerial photograph shows the detoxification process nearing completion at the Warren County site in 2003. The black mounds are the piles of treated soil to be put back into the landfill. Photo courtesy of EarthTech Inc.*